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**Plate 1**. Nest and eggs of the Slaty Bunting *Emberiza siemsseni*, Lianhuashan Nature Reserve, Kangle county, Gansu province, China, 3 July 2014.

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**Plate 2**. Slaty Bunting nestlings at 10 days old, Lianhuashan Nature Reserve, 22 July 2014.

the species. By checking the bird species list of the reserve (Sun *et al*. 2008) and many birdwatching notes, we confirmed that it was a new record for Lianhuashan. Between late April and early June 2014, we trapped four male Slaty Buntings; only one male was seen in 2015, on 15 April; in 2016 we trapped one male, on 19 May. We tried to locate more birds by using song playback and mist-nesting, but none were found in either the 2015 or 2016 breeding seasons. These records suggest that the Slaty Bunting may have extended its breeding range to the north in recent years, although more field evidence is needed to verify this. We hope that our findings will stimulate other ornithologists to search for nests and collect more information about the species's breeding biology in its normal breeding range.

## Acknowledgements

We thank Chen Lijun for providing details of the 2015 record, and Lou Yingqiang and the staff of Lianhuashan Nature Reserve for their help in the field. This work was funded by National Natural Science Foundation of China (No. 31270468).

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# Further evidence that wasps prey on nestlings

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Social wasps of the family Vespidae forage for water, pulp, carbohydrates and animal protein. When hunting, they are opportunistic generalists and use a variety of mechanisms to locate and choose prey which they consume directly (Edwards 1980, Richter 2000). There are complicated ecological associations between wasps and birds (Almeida & Anjos-Silva 2015), such as competition for food (Beggs 2001). However, increasing evidence shows that birds are one of the important predators of wasps (Windsor 1976, Henriques & Palma 1998, Almeida & Anjos-Silva 2015), but wasps are also thought to kill nestlings (Moller 1990). Here, we summarise a striking example of wasp–bird interactions.

During the 2015 breeding season, we studied the feeding habits of Red-billed Leiothrix *Leiothrix lutea* at the Laojunshan National Nature Reserve, Sichuan province, south-west China (28.660–28.727°N 103.960–104.070°E). The reserve lies between 900 and 2,000 m. The climate is temperate (annual average temperature 12.0–14.7°C) with high precipitation (more than 1,500 mm per year) and the characteristic vegetation is evergreen broadleaf forest (Fu *et al*. 2011). Social wasps are common in the lower parts of the reserve.

On the afternoon of 11 August 2015, we recorded the predation of Red-billed Leiothrix nestlings in nest 30-2015, by social wasps. The four nestlings were about three days old and the main sequence of events was recorded using a Canon SX50 HS digital camera as detailed here. At 16h26:31 an adult leiothrix arrived and cleaned the nest. The nestlings were active at the time; the adult left at 16h27:04. Then at 16h32:58, a single wasp arrived, entered the nest and killed the four nestlings; it left at 16h39:05, carrying nestling flesh (Plate 1). At 16h50:21 an adult leiothrix arrived with insects to feed the

**Plates 1–4** show the sequence of events during the predation of Red-billed Leiothrix *Leiothrix lutea* nestlings by social wasp species recorded by digital camera, between 16h39 and 17h11 on 11 August 2015. All images are screen shoots.

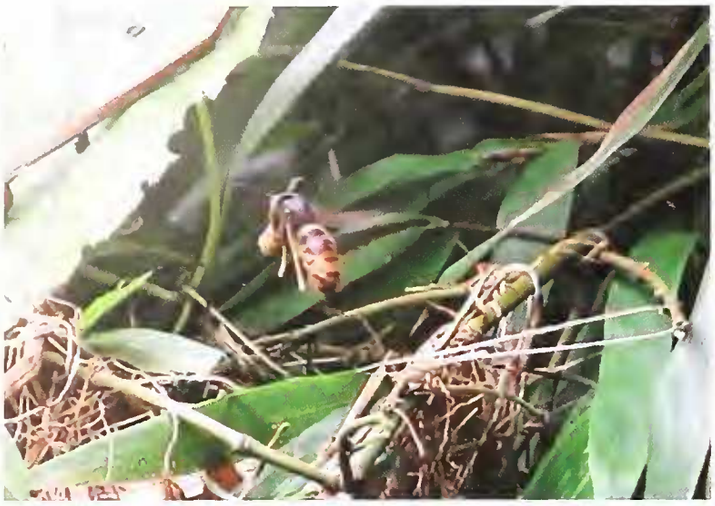

**Plate 1**. The killer wasp leaves the nest at 16h39:05 carrying nestling flesh, after killing all the nestlings.

**Plate 2.** At 16h50:21 an adult Red-billed Leiothrix discovers the dead nestlings.

**Plate 3**. The third visit by a wasp, seen leaving at 17h07:11 carrying nestling flesh.

**Plate 4**. At 17h11:22 an adult Red-billed Leiothrix catches and eats a visiting social wasp whole.

nestlings but found that they were dead (Plate 2); it left the nest at 16h52:14. Then it (or another adult) returned at 16h54:33, but was flushed at 16h54:53 when we came to replace the camera card between 16h55 and 17h00. At 17h00:46 a wasp arrived at the nest and remained until 17h02:28, then at 17h04:44 it (or another wasp) came to the nest and remained until 17h07:11, when it left carrying nestling flesh (Plate 3). At 17h10:22, a wasp arrived and was still at the nest when, at 17h11:22, an adult leiothrix arrived and very quickly swallowed the wasp whole (Plate 4). The adult leiothrix left the nest at 17h11:23. During the following 29 minutes, the adult birds came to the nest twice and wasps seven times. Each visit was by a single wasp, but we were not sure whether all visits were made by the same individual. Monitoring ended at 17h40.

At about 10h30 the next day we visited the nest again and found that all that remained was the headless body of one nestling, though it is not possible to say whether this was due to action by the wasps or other predators. During this sequence of events, it was apparent that wasps adopted the strategy of still-hunting and we did not see the wasps attacking the adult birds.

During the summer of 2013, Y-QF had seen a wasp flying out of the nest of an Emei Shan Liocichla *Liocichla omeiensis* in the reserve. He investigated and found that a nestling, estimated to be two or three days old, had just died in the nest. It was probable that the wasp had killed the nestling.

Wasp larvae are fed largely on animal protein such as arthropods (Akre 1982, Richter 2000). In comparison with hunting for unpredictable arthropod prey, immobile broods of nestling birds are a more stable and abundant food resource for adult wasps with larvae to feed. It can be assumed that wasps kill nestling birds when the adults are away foraging, leading to the parent birds abandoning the nest so that the wasps are not subsequently disturbed during their feeding activities. Evidently predation of nestlings by wasps does occur, although, as we observed, it is clearly a high risk strategy. We found three records in the literature of newly-hatched chicks being killed by wasps (Wild 1927, Grant 1959, Moller 1990). Such behaviour is difficult to detect during fieldwork and we join Moller (1990) in speculating that wasps kill nestlings much more often than the few records above suggest. So far, to our knowledge, there is no direct evidence to indicate successful predation of adult birds by wasps and although social media and hummingbird enthusiasts make much of wasp and bee 'attacks' at feeders, there is little hard evidence that hummingbirds are killed in such cases. Our own experience demonstrated that a lone social wasp was no match for the adult leiothrix.

## Acknowledgements

This work was supported by the National Natural Science Foundation of China (No.31272330) and the Scientific Research Innovation Team Projects, Leshan Normal University.

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# Olive-backed Sunbird *Cinnyris jugularis* assisting Crested Bunting *Melophus lathami* at the nest: substantiated evidence for interspecific feeding, Guangxi, south-west China

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## Introduction

Avian brood parasitism can occur at both intraspecific and interspecific levels. Intraspecific behaviour may be quite difficult to observe without marked individuals, but can have major effects on reproductive fitness (Semel & Sherman 2001). Interspecific brood parasitism is more obvious and usually encountered in cases of specialised brood parasites such as cowbirds and cuckoos (Rothstein & Robinson 1998). However, ornithologists have long been making observations of rare cases in which non-parasitic birds give parental care to heterospecific nestlings (Shy 1982). This behaviour is usually considered to be some sort of mistake, in which there was an error by the parent bird in their recognition of their offspring. Generally, feeding nestlings directly increases parental mortality (Owens & Bennett 1994). Therefore, interspecific helping at the nest is likely to be almost always maladaptive, unless interspecific helpers learn parenting skills, a suggestion for which there is little evidence as yet (Shy 1982).

The majority of observations of such interspecific nest feeding are quite old and did not use techniques such as nest videography, which has in recent decades revolutionised studies of avian parental care (Reif & Tornberg 2006), by allowing the investigation of events such as nest predation (Pietz & Granfors 2000). In the context of interspecific nest feeding, cameras can yield information on the magnitude of the mistake—for example, the extent of parental care provided, duration of the behaviour, how the behaviour compared with that at normal nests, including the types of food given to nestlings, and was the mistake ever recognised?

We report here on an observation of the Olive-backed Sunbird *Cinnyris jugularis* feeding nestlings of the Crested Bunting *Melophus lathami* in a limestone karst area of southern China.

## Methodology

On 6 May 2014, we found adult Olive-backed Sunbird and Crested Bunting still actively incubating on their nests in a village area at an altitude of about 200 m adjacent to the Nonggang Forest Reserve (22.474°N 106.958°E), Guangxi, China. The reserve is largely limestone seasonal rainforest (Jiang *et al.* 2014), surrounded by degraded forest and agriculture, particularly sugarcane. When the eggs hatched, we noticed interspecific feeding at the bunting nest and placed a Kodak Zx1HD Pocket Videocamera near both nests. For the purpose of comparison, towards the end of the same month, we also video-recorded one other Olive-backed Sunbird nest and two other Crested Bunting nests, all less than 1.5 km away and fed by conspecific parents; we used two normal bunting nests because the nestlings in the first nest fledged after only one day (17 May). From the video-recordings, we measured the rates of food provisioning and also attempted to determine the kinds of food items provided. Observations ended when the chicks fledged.

## Results

### Nests and nestlings

The Olive-backed Sunbird and Crested Bunting nests, found on 6 May at a sugarcane farm, were 180 cm apart and each contained three nestlings (Plate 1). The Olive-backed Sunbirds' nest was an oblong purse, made of slender grasses and a few leaves, 22 cm in length, with a breadth of 6.2 cm, and was hung on the tip of a climbing fig *Ficus pumila* about 290 cm above ground (Plate 2). The Olive-backed Sunbird parents entered the side of the nest by a circular entrance about 2.5 cm in diameter. The Crested Bunting nest was an open cup (outer diameter 11.0 cm, inner diameter 7.8 cm, outer nest height 6.3 cm, bowl depth 2.5 cm), built mostly of dry grass and twigs and placed on the side of a wall about 188 cm above ground (Plate 3).

The control nests with two Crested Bunting parents and no helpers were both positioned on big rocks about 50 cm above the ground. The Olive-backed Sunbird control nest was hung from the branch of a *Ficus microcarpa* tree about 210 cm above the ground. The control nests were in similar habitat and were similar in size and construction to the original nests described above.

The Crested Bunting nestlings in the abnormal nest (hereafter referred to as the 'mixed nest') hatched by the morning of 7 May, and the Olive-backed Sunbird nestlings, at their nest adjacent to the mixed nest, hatched by the morning of 8 May. All the nests, including the controls, had three nestlings each.

### Parental feeding behaviour

Throughout the period of our observations, we never observed the female Crested Bunting. Our video-recordings demonstrated that interspecific parental care was primarily given by the male Olive-backed Sunbird; the female sunbird was seen to feed interspecifically, but only a few times (Figure 1). The interspecific feeding visits by the male sunbird were frequent—almost as many as the male Crested Bunting—and prolonged, as they continued until the bunting chicks